May 8, 1928.

1,668,764

J. B. EDWARDS

RHEOSTAT

Filed March 12, 1924

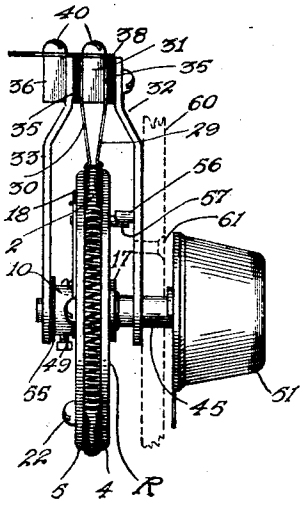

Fig. 2.

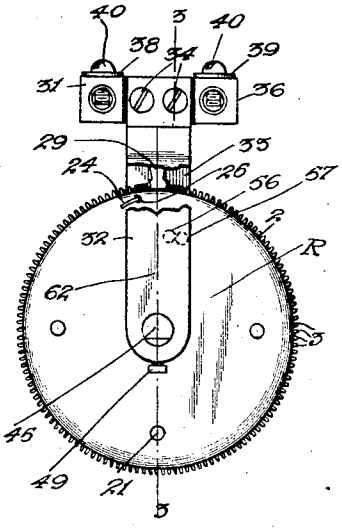

Fig. 1.

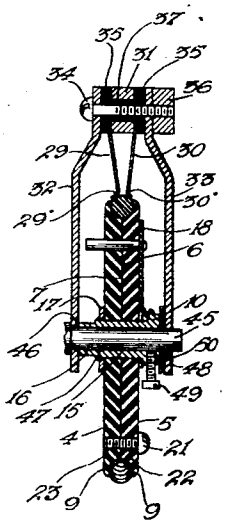

Fig. 3.

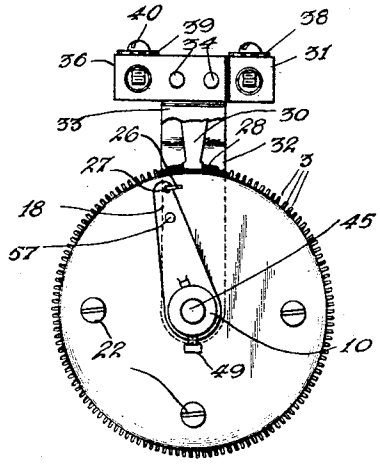

Fig. 4.

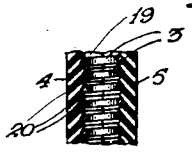

Fig. 6.

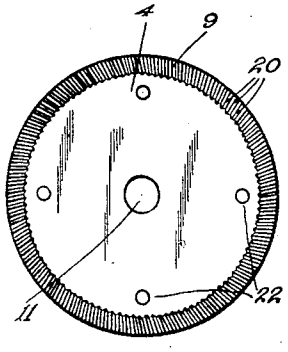

Fig. 5.

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UNITED STATES PATENT OFFICE.

JOSEPH B. EDWARDS, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

RHEOSTAT.

Application filed March 12, 1924. Serial No. 698,645.

My invention relates to rheostats used in connection with an electric circuit for varying the resistance therein and more particularly for use in controlling the current flow through the filament of an audion or electron tube; and an object of my invention is to provide a rheostat which is simple in construction and operation but very durable and efficient.

A feature of my invention is the provision of an improved helically wound resistance unit supported between a pair of disk members which when clamped together secure the resistance unit in position against movement relative to the disks, the disks and resistance unit as a whole forming a compact and efficient rotatable unit.

Another feature of my invention is the provision of an arcuate shaped groove for each disk positioned at the peripheral edge of the inside face of each disk, the arcuate surface of each groove being corrugated and in which the convolutions of the resistance unit rest when the same is clamped between the two disks to secure the resistance unit as a whole in the annular channel formed by the arcuate grooves against displacement or movement.

The above features, as well as others, will be more particularly pointed out in the ensuing specification and for a more complete understanding of the rheostat of my invention reference may be had to the accompanying drawing in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a front view of the rheostat of my invention illustrating the same in its normal or off position;

Fig. 2 is a left side view of Fig. 1;

Fig. 3 is a sectional view along the line 3—3 of Fig. 1;

Fig. 4 is a back plan view of the rheostat of my invention;

Fig. 5 is a view of one of the disks of the rotatable element clearly illustrating the arcuate shaped corrugated groove, and

Fig. 6 is a partial enlarged sectional view of the disks illustrating the helical resistance unit clamped in position with its convolutions resting in the corrugations.

Referring now more in detail to my invention as illustrated in the accompanying drawing, the rheostat of my invention comprises a helically wound resistance unit 2 of a plurality of convolutions 3, constructed of suitable resistance material and of a predetermined resistance. The rotatable element R which supports the resistance unit 2 comprises a pair of disks 4 and 5 moulded of suitable insulation material such as bakelite. The inside faces 6 and 7 of the disks 4 and 5 are each provided with an annular arcuate groove 9 positioned at the peripheral edge of the disks 4 and 5. The disks 4 and 5 are assembled to form the rotatable element R by placing the inside faces 6 and 7 of the disks 4 and 5 together in match relation with each other by means of a sleeve member 10 which extends through aligned central orifices 11 of the disks 4 and 5. The sleeve 10 is provided with an intermediate reduced portion 15 and a further reduced portion 16, the portion 15 of the sleeve 10 extending through the central orifices 11 of the disks 4 and 5 with the reduced end portion 16 protruding forward of the disk 4. The intermediate reduced portion 15 of the sleeve 10 protrudes slightly beyond the face of the disk 4 and a washer 17 is slipped over this protruding portion which is then upset by suitable means to secure the disks 4 and 5 together and prevent the sleeve 10 from turning in the orifices 11 in the disks 4 and 5. A plate 18 provided with a central orifice is slipped over the sleeve 10 and rests between the said sleeve 10 and the disk 5 for purposes as will presently be described. The arcuate grooves 9 of the disks 4 and 5 form when the said disks are assembled as just described, an annular circular channel 19 which contains the helical resistance unit 2 which is placed therein during the assembly of the disks 4 and 5. The annular grooves 9 are provided with corrugations 20 in which the convolutions 3 of the resistance 2 rest and screws 21 which pass through orifices 22 in the disk 5 have screw threaded engagement with aligned tapped orifices 23 in the disk 4 to additionally clamp the disks 4 and 5 together to prevent turning of one disk relative to the other on the sleeve 10 and also clamp the resistance unit in the corrugated channel 19 formed by the arcuate grooves 9 for purposes as will presently be described. The end 24 of the resistance unit 2 passes through a suitable orifice 25 in the disk 4 and is bent over to secure it in position therein and the end 26 of the unit 2 extends through a suitable orifice in the disk

5 and an orifice 27 in the plate 18 to connect the end 26 of the unit 2 with the sleeve 10 which is in turn conductively connected with the terminal 39. An insulating member 28 is also clamped in the channel 19 and separates the respective ends of the resistance unit 2 and also is engaged by the wipers 29 and 30 associated with the resistance unit 2 when the unit R which supports the resistance unit 2 is in its normal position.

The wipers 29 and 30 are provided for engaging the helical resistance unit 2 and are separated by means of a suitable terminal block 31. A pair of mounting legs 32 and 33 are provided between which the terminal block 31 and wipers 29 and 30 are clamped by means of a suitable clamping screw 34. The terminal block 31 and wipers 29 and 30 are suitably insulated from the mounting legs 32 and 33 by means of suitable insulation strips 35, and the clamping screws 34 which pass through suitable orifices in the mounting legs 32 and 33 terminal block 31 and wipers 28 and 29 and insulation strips 35 have screw threaded engagement with suitable tapped orifices in a terminal block 36 and are insulated from the terminal block 31 and wipers 29 and 30 by insulation bushings 37. Suitable terminals 38 and 39 are secured to the terminal blocks 31 and 36 by means of screws 40.

The unit R and its supported parts as a whole are rotatably supported between the legs 32 and 33 and to position the same so as to be rotatably supported the unit R is inserted between the legs 32 and 33 with the insulating member 28 resting between the wiper ends 29′ and 30′. A shaft 45 is now inserted through an orifice 46 in the leg 32 and through the central orifice 47 in the sleeve 10, through an orifice in plate 18 and through the orifice 48 in the leg 33, and a set screw 49 having screw threaded engagement with the tapped orifice 50 in the sleeve 10 engages the shaft 45 to secure the unit R as a whole to the shaft 45 so that when the actuating knob 51 which is secured to the end of the shaft 45 in any suitable manner is turned the shaft 45 which rotates in the bearing orifices 46 and 47 in the legs 32 and 33 and its supported unit R rotate as a whole to place the convolution 3 of the resistance unit 2 in engagement with the wiper ends 29′ and 30′ to include a certain amount of resistance in the operating circuit in which my rheostat is being used and when the rotatable unit R is rotated back to its normal position the insulation separator 28 again engages the wiper ends 29′ and 30′.

As previously described the convolutions 3 of the resistance unit 2 when the said unit is partially encompassed by the channel 19 rest in the corrugations in the groove 9 when the disks 4 and 5 are secured together as before described to clamp the resistance unit 2 in position so that as the unit R is rotated to place its supported unit 2 in engagement with the wipers 29 and 30 the individual convolutions 3 will at all times remain in their proper spaced relation with their adjacent convolutions and also prevent the resistance unit 2 as a whole from creeping in the channel 19.

The set screw 49 prevents removal of the shaft 45 and to maintain the rotatable unit in any of its adjusted positions I provide a dished or spring washer 55 which when inserted between the end of the sleeve 10 and the leg 33 produces a frictional effect between the end of the sleeve 10 and the washer 55 to hold the rotatable unit R in any of its adjusted positions. I provide a stop pin 56 which is secured to the leg 32 and a pin 57 secured to the rotatable unit R in any suitable manner engages the pin 56 in its off position and its extreme off normal position to limit the rotation of the unit R in its off and extreme on positions.

In Fig. 2 I illustrate the rheostat mounted upon a panel 60 shown in dotted lines by means of a screw 61 which extends through a suitable orifice in the panel 60 and has screw threaded engagement with a suitable tapped orifice 62 in the leg 32.

While I have described a preferred embodiment of my invention, it is to be understood that I do not wish to be limited to the exact structure as shown and described, as changes and modifications will readily suggest themselves and I therefore aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. A device of the character described including a pair of members adapted to form U-shaped mounting and supporting means for a pair of terminals, a rotatable shaft and means for preventing the excessive rotation of said shaft, a resistance element formed of spirally wound convolutions of conducting material, a pair of disks secured together to form a unit, a semi-circular cut-away portion in the inner portion of the peripheral edge of each of said disks, said cut-away portions forming a groove, substantially circular in shape, for supporting and partially encompassing said resistance element, depressions slantingly formed in the face of said cut-away portions of a size to receive the convolutions of said resistance element, said depressions in one of said disks adapted to cooperate with the depressions in the other of said disks to form continuous depressions each adapted to receive a single convolution of the said resistance element to support the same and prevent it from creeping in said groove, and a pair of wipers in operative relation with said re-

sistance element, both of said pair of wipers being adapted to simultaneously engage the same convolution of the resistance element.

2. In a device of the character described including a pair of members adapted to form U-shaped supporting means for a wiper element, a rotatable shaft, and means for preventing the excessive rotation of said shaft, a resistance element comprising a plurality of convolutions of conducting material, said wiper element comprising a pair of wipers adapted to simultaneously engage the same convolutions of said resistance element, a pair of disks adapted to be secured together to form a unitary structure by means including a sleeve member having its ends upturned to engage the outside faces of the disks and adapted to be affixed to the said rotatable shaft whereby said disks are rotatably secured on said shaft, a semi-circular cut-away portion in the inner portion of the peripheral edge of each of said disks, said cut-away portions forming a groove substantially circular in shape adapted to receive said resistance element and support and partially encompass the same, means located near the periphery of said disks adapted to engage said disks to prevent movement of said disks relative to each other and to clamp said resistance element in said groove against displacement, depressions slantingly formed in the face of said cut-away portions of a size to receive the convolutions of said resistance element, said depressions in one of said disks adapted to cooperate with the depressions of the other of said disks when the same are clamped together to form continuous depressions each adapted to receive a single convolution of the said resistance element to support the same and prevent it from creeping in said groove.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 10th day of March, 1924.

JOSEPH B. EDWARDS.